

Reply to Office Action of September 16, 2005

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Please cancel claims 1-20 and add the following new claims 21-40.

21 (new) A solid state ion gauge for analyzing a sample gas having multiple gas constituents, comprising:

a first and a second mutually opposing substrate of semiconductor material separated a predetermined distance so as to form an elongated intermediate gas ionizing cavity region and including an open side inlet for feeding a sample of gas to be analyzed into said gas ionizing cavity region;

a source of electrons located on a surface of said first substrate facing a surface of said second substrate;

a collector of electrons, opposing said source of electrons, located on said surface of said second substrate;

an ion anode pad located on said surface of the first substrate adjacent said source of electrons;

a gate electrode located in a space between the source of electrons and the collector of electrons;

an ion anode located on the surface of said second substrate adjacent said collector of electrons;

an ion detector located at one end of said first substrate for receiving ions generated in the gas ionizing region when electrons from said source of electrons travel through said sample of gas toward said collector of electrons and collide with molecules of the gas sample;

an ion deflector located on said second substrate for moving ions in the gas ionizing region toward the ion detector; and,

Reply to Office Action of September 16, 2005

first and second magnet elements respectively located on said first and second substrates for generating a magnetic field across and through the gas ionizing region for controlling a travel path of electrons through the ionizing region when generating ions of the gas sample.

22. (new) An ion gauge according to claim 21 wherein said source of electrons comprises a plurality of electron sources.

23. (new) An ion gauge according to claim 22 wherein the plurality of electron sources are arranged in a predetermined pattern.

24. (new) An ion gauge according to claim 21 wherein the plurality of electron sources comprises an emitter array.

25. (new) An ion gauge according to claim 24 wherein the emitter array comprises an array of semiconductor p-n junctions.

26. (new) An ion gauge according to claim 24 wherein the emitter array is of a predetermined size and the gate electrode comprises a layer of electrode material between the emitter array and the collector and having an area substantially equal in size to the size of the emitter array.

27. (new) An ion gauge according to claim 26 wherein the collector of electrons comprises a layer of electrode material substantially equal in size to the size of the emitter array and the gate electrode.

Reply to Office Action of September 16, 2005

28. (new) An ion gauge according to claim 27 wherein said ion anode pad comprises a layer of electrode material adjacent to and partially surrounding the area of the gate electrode.

29. (new) An ion gauge according to claim 28 wherein said ion anode comprises a layer of electrode material adjacent to and partially surrounding the collector electrode.

30. (new) An ion gauge according to claim 21 wherein the ion detector comprises a plurality of detector pads.

31. (new) An ion gauge according to claim 30 wherein the detector pads are located on a sloped surface of the first semiconductor substrate facing the cavity region.

32. (new) An ion gauge according to claim 30 and additionally including a detector readout circuit located adjacent the detector pad on the first substrate.

33. (new) An ion gauge according to claim 21 wherein the second semiconductor substrate includes a plurality of grooves formed in the surface of said second substrate opposing the source of electrons and containing the collector of electrons therein.

34. (new) An ion gauge according to claim 33 wherein the grooves include substantially flat inclined side walls.

Reply to Office Action of September 16, 2005

35. (new) An ion gauge according to claim 33 wherein the plurality of grooves comprise a plurality of mutually parallel V-shaped grooves aligned over the source of electrons.

36. (new) An ion gauge according to claim 21 wherein the first and second magnet elements comprise a pair of oppositely poled magnetic films respectively located on an outside surface of said first and second substrates.

37. (new) An ion gauge according to claim 36 wherein said first and second substrates are comprised of silicon.

38. (new) An ion gauge according to claim 21 and additionally including spaced elements for holding the substrates apart in an aligned state.

39. (new) An ion gauge according to claim 21 wherein the first substrate of semiconductor material comprises an emitter base chip and the second substrate of semiconductor material comprises an electron collector chip.

40. (new) An ion gauge according to claim 39 wherein said semiconductor material comprises silicon.